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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,693	11/21/2003	Kenneth O. McElrath	3006.002000/KDG	1355

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EXAMINER	
WALFORD, NATALIE K	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 08/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/719,693	MCELRATH ET AL.	
	Examiner	Art Unit	
	Natalie K. Walford	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Amendment, filed on July 25, 2006, has been entered and acknowledged by the Examiner.

Claims 1-10 are pending in the instant application.

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Objections

Claims 1-2 and 5-6 are objected to because of the following informalities:

Regarding claims 1-2 and 5-6, it is unclear as to what "cross-sectional dimension" is defined as. The Examiner is unsure as to whether it the width of the carbon nanotube particulate or the length of the carbon nanotube particulate. For examination purposes, the Examiner notes that the cross-sectional dimension will be taken to mean the cross-sectional length of the carbon nanotube particulate.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Smalley et al. (US PUB 2002/0085968) in view of Jin et al. (US 6,250,984).

Regarding claim 1, Smalley discloses a carbon nanotube particulate on a surface wherein the carbon nanotube particulate comprises entangled small-diameter carbon nanotubes (page 7, paragraph 89) arranged in a three-dimensional network (Abstract) wherein the small-diameter nanotubes have an outer diameter in a range of about 0.5 nm and about 3 nm (page 7, paragraph 88), wherein the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns (page 7, paragraph 88), but does not expressly disclose that carbon nanotube particulate is an electron emitter, as claimed by Applicant. Jin is cited to show a carbon nanotube is used as an electron emitter (FIG. 12, item 112) in a field emission display (column 3, lines 8-14). Jin also shows that carbon nanotubes are typically in the form of high-aspect ration fibers resembling tangled spaghetti or needles and can single or multi-walled nanotubes (column 5, lines 51-59) and teaches that the nanotubes tend to have sharp, field-concentrating tips useful for electron field emission (column 5, lines 59-61).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Smalley's invention to include the carbon nanotube particulate as an electron emitter as suggested by Jin for using the carbon nanotube as an electron emitter.

Regarding claim 2, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the particulate has a cross-section dimension in the range of about 0.1 micron and about 3 microns (Smalley; page 7, paragraph 88).

Regarding claim 3, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the carbon nanotubes are selected from the group consisting of single-

walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, quadruple-walled carbon nanotubes and combinations thereof (Smalley; page 3, paragraph 58).

Regarding claim 4, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the carbon nanotube particulate comprises ropes of carbon nanotubes (Smalley; page 7, paragraphs 88-89).

Regarding claim 5, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the ropes have a cross-sectional dimension in a range of about 10 nm and about 50 nm (Smalley; page 7, paragraph 88).

Regarding claim 6, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the ropes have a cross-sectional dimension less than 10 nm (Smalley; page 7, paragraph 88).

Regarding claim 7, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the carbon nanotube particulates comprise small-diameter carbon nanotubes having more than about 10 small-diameter carbon nanotubes/ μm^2 surface area of the carbon nanotube particulates (Smalley; page 7, paragraph 89).

Regarding claim 8, Applicant is claiming the product of a carbon nanotube particulate including a method (i.e. a process) of making the carbon nanotube particulate activated by etching, consequently, claim 8 is considered a "product-by-process" claim. In spite of the fact that a product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, is the product itself which must be new and not obvious. If the product in the product-by-process claim

is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Accordingly, the structure implied by the process steps would be considered for assessing the patentability of product-by-process claims over the prior art (see MPEP 2113).

Regarding claim 9, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the electron emitter is a component in a cathode (Smalley; FIG. 6, item 110) of a field emission device.

Regarding claim 10, the combined reference of Smalley and Jin disclose the electron emitter of claim 9 wherein the field emission device is selected from the group consisting of electron tubes, amplifiers, oscillators, mixers, microwave components, discharge initiators, laser tubes, spark gaps, controlled discharge tubes, directed energy devices, display tubes, flat-panel displays and combinations thereof (Jin; column 3, lines 11-14).

Response to Arguments

Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Applicant has respectfully traversed the rejection regarding the Smalley reference. The Examiner notes that Smalley is describing the "felt" that may be produced in paragraph 89. Smalley discloses that the single-wall carbon nanotubes are in ropes and range in the diameter of 2 to 20 nm. The single-wall carbon nanotubes in each rope are arranged to form a rope with a length of 0.1 up to 1,000 microns (page 7, paragraph 88). Applicant points to paragraph 89 for

the felt or mat having a size of 10^2 mm, 100^2 mm, $1{,}000^2$ mm, or greater, but the Examiner notes that this is referring the cross-sectional area and not the cross-sectional dimension. The Examiner has selected the embodiment of the single-wall carbon nanotubes since Applicant's limitations are met by the Smalley reference (page 7, paragraph 88). The Examiner also notes that the reference of Jin ('984) teaches tangled carbon nanotubes that can be either single or multi-wall carbon nanotubes (column 5, lines 51-61). Hence, the combination of the Smalley and Jin ('984) meet the limitations as claimed by Applicant.

Conclusion

Applicant's amendment, filed on February 13, 2006, necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie K. Walford whose telephone number is (571)-272-6012. The examiner can normally be reached on Monday-Friday, 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

nkw

8/3/06

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